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Analysis of Feeding Behavior and Family Food Security as a Stunting Risk Factor in Semarang City

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Abstract

Stunting can be caused by many factors, including how a mother feeds her child. How much a family eats and how secure their food supply is affects the number of short toddlers. This study examines feeding behavior, family food security, and stunting in Semarang. Quantitative observational analytic case-control study of 83,397 stunting-risk families. This study included 100 Semarang families at risk of stunting, with 50 cases (cases) and 50 controls (controls). This study used univariate and bivariate analysis. The bivariate analysis showed a relationship between feeding behavior and the incidence of stunting in Semarang City (p-value = 0.002, OR = 4.030, 95% CI 1.712–9.488). Children who are cared for with inappropriate feeding behavior have a significantly greater risk of experiencing stunting compared to children who are cared for with appropriate feeding behavior. In addition, the relationship between family food security and the incidence of stunting in the city of Semarang was also confirmed to be statistically significant (p-value = 0.000, OR = 6.833, 95% CI 2.732-17.093). Children who are cared for in food-insecure families are six times more at risk of experiencing stunting compared to children who are cared for in food-secure families. Based on the research data, it can be concluded that there is a relationship between feeding behavior and family food security and the incidence of stunting in the city of Semarang.

Introduction

Stunting is still a nutritional health problem in Indonesia. Stunting is a nutritional problem experienced by toddlers, where toddlers experience conditions of failure to thrive as a result of chronic malnutrition so that toddlers are too short for their (Budhathoki, Bhandari, Gurung, Gurung, & KC, 2020; Fuada, Latifah, Yunitawati, & Ashar, 2020). Stunting is a continuous process that does not happen suddenly (Tanjung, Prawitasari, & Rusli Sjarif, 2020). Broadly speaking, stunting (Prasetyo et al., 2023; Suhenda, Rum Giyarsih, Listyaningsih, & Nugroho, 2023) is caused by a lack of nutrition for a long time and the occurrence of recurrent infections. Both of these causative factors are influenced by inadequate parenting from the womb to the first 1,000 days of birth (Habimana & Biracyaza, 2019; Hendraswari, Purnamaningrum, Maryani, Widyastuti, & Harith, 2021).

Early-life malnutrition increases baby and child mortality, makes them more susceptible to illness, and affects their adult body posture (Santosa, Novanda Arif, & Abdul Ghoni, 2022). Stunting can also have long-term effects on children, affecting their future productivity, health, and education (Gani et al., 2021). Stunted toddlers frequently struggle to reach their full potential for physical and psychomotor development (Alderman, Nguyen, & Menon, 2019). Childhood stunting is associated with increased mortality, decreased cognitive ability, delayed motor development, and unbalanced bodily systems (Rezapour, Mostafavi, & Khalkhali, 2016).

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Stunting is a serious issue that requires immediate treatment, and the government is quite concerned about it. The government has undertaken efforts to expedite the decrease of stunting by the 2018 National Plan for the Acceleration of Stunting Prevention. However, the stunting rate has not yet reached the WHO's minimum target. The reason for this is that stunting prevention programs have not been successful, coordination for the implementation of specific and sensitive nutrition interventions has not been optimal at all levels related to planning and budgeting, implementation, monitoring, and evaluation, the allocation and utilization of resources and funding sources have not been effective and efficient, the capacity and the limited quality of program implementation, and advocacy, campaigns, and dissemination (Kementerian PPN, 2018).

The prevalence of stunting in Indonesia was estimated at 27.67% based on Nutrition Status Monitoring (PSG) data in 2019, which is still over the WHO recommendation that the prevalence of stunting in a country should not exceed 20%. According to PSG data, the prevalence of stunting in Central Java increased from 2014 to 2017, going from 22.6% to 24.8% to 23.9% to 28.5%. Compared to 21% in Semarang City, the prevalence. The stunting rate for Central Java Province remains high at 20.9%, and it is likewise high for Semarang City, according to data from the 2021 Indonesian Nutrition Status Survey (SSGI). Semarang City is one of the regencies or cities in Central Java where the frequency of stunting is still significant, above the provincial average of 21.33%, according to the SSGI 2021 statistics. Along with a high prevalence of stunting, Semarang also has a significant number of families who could be at risk for stunting, or 171,662 (40.73%) of the city's total family population of 421,435 households. Stunting management is the primary emphasis of the Semarang City Population Control and Family Planning Service in the 34 subdistricts that make up KB Villages (Quality Family Villages). According to the findings of the Semarang City Health Service's weighing operation in 2021, the city's stunting prevalence rate is 3.10% or 1,367 out of 44,058 weighed children under five.

Stunting can result from a variety of growth factors, and one of them is a lack of availability of wholesome food (Febriana & Nurhaeni, 2019). Children's growth is influenced by the amount of nutrients they ingest, so the food they consume must be able to satisfy all of their nutritional needs (Mahmudiono, Nindya, Andrias, Megatsari, & Rosenkranz, 2018). Consuming a variety of meals can help you complete your daily nutritional requirements (Agostoni, Baglioni, La Vecchia, Molari, & Berti, 2023; Donkor et al., 2022; Karbin et al., 2022; Modern, Mpolya, & Sauli, 2022) or supplement your diet (Basri et al., 2021). The mother's or caregiver's feeding behavior is another element that affects how well-nourished a child is (Hanani & Susilo, 2020; Widanti, Utami, & Nurlaily, 2020).

Toddler stunting incidence is also influenced by inadequate family food consumption and the degree of family food security (Hanani & Susilo, 2020). Compared to children aged 6-59 months from households with good food security, children from households with moderate food insecurity were 2.47 times more likely to experience severe stunting (AOR = 2.47; 95% CI [1.77, 3.46]), and children from households with severe food insecurity were more likely to experience severe stunting (AOR = 1.82; 95% CI [1.34, 2.48]) (Agho et al., 2018). Gross motor abilities were significantly worse in kids from homes with acute food poverty 3 months earlier (β −0.14; 95% CI [0.27, −0.0033]; p = 0.045). Gross motor abilities were significantly worse in kids from homes with higher levels of food insecurity over the previous two years (in intensity) (β −0.047; 95% CI [−0.077, −0.018]; p = 0.002). Moreover, children who experienced food insecurity for a longer period had significantly worse gross motor abilities (β −0.050; 95% CI [−0.087, −0.012]; p = 0.010) (Milner, Fiorella, Mattah, Bukusi, & Fernald, 2017). This study was done to give a broad picture of eating habits, food security in families, and the prevalence of stunting in Semarang. In connection to the prevalence of stunting in Semarang, this study seeks to examine the association between feeding behavior and family food security.

Method

In the city of Semarang, this study was

conducted using a case-control study design and quantitative observational analysis. The participants in this study were 171,622 at-risk households with 83,397 under-fives and/or toddlers from 83,397 families at risk of stunting in Semarang City. Based on the findings of the 2021 Family Data Collection, population data was collected (PK21). The sample for this study consisted of 100 families in Semarang who were at risk for stunting, with information on 50 families who had stunted children under five (cases) and 50 families who did not (controls). Based on the 2022 PMT Stunting Toddler Target, Semarang City's proportion of stunting events was 3.10 percent in this study, and the researchers' assessed percentage of clinical judgment was 21.3%. (based on the proportion of stunting events in Semarang City according to SSGI data for 2021). Example of a case-control calculation using the following formula:

$$n1 = n2 = \frac{(Z_\alpha\sqrt{2PQ} + Z_\beta\sqrt{P_1Q_1 + P_2Q_2})^2}{(P_1 - P_2)^2}$$

Formula description:

P1 = standard effect proportions (from the library)

P2 = the proportion of the effect on the therapy studied (based on the clinical judgment of the researcher)

Q1 = 1 – P1

Q2 = 1 – P2

P = ½ (P1 + P2)

(Source: (Sastoasmoro, 2008)

Feeding behavior, household food security, and the prevalence of stunting in the city of Semarang were the variables examined in this study. To provide a complete view, these factors are descriptively investigated by presenting tables and narratives. In this study, both univariate and bivariate analyses were conducted. Each study variable's features are intended to be explained or described using univariate analysis. A bivariate analysis was done to see how each variable related to the others. This research has passed the ethical clearance number: KE/UGM/045/EC/2022 issued by the Research Ethics Commission at Gadjah Mada University on November 22, 2022.

Results and Discussion

Most of the respondents in this study were older than 25 years (82%), had higher education (high school and above) as much as 73%, did not work (71%), and earned less than IDR 2,000,000 (92%). More than half of the families in this study have family food security in the food security category (61%). In this study, it was also known that there were more respondents with proper toddler feeding behavior (60%) (Table 1).

The proportion of families in the food insecurity category was higher in the stunting group (60%) compared to the non-stunted group (18%). The proportion of families in the food secure (El Bilbeisi et al., 2022; Muslihah, Wilujeng, & Kusuma, 2022)category was higher in the non-stunted group (82%), compared to the stunted group (40%). Based on Table 2, there is a statistically significant relationship between family food security and the incidence of stunting (p-value = 0.000) with an OR value of 6.833 (95% CI 2.732–17.093). Children who are cared for in food-insecure families are six times more at risk of experiencing stunting compared to children who are cared for in food-secure families. Given that the OR value is > 1 and the CI range does not exceed 1, the conclusion is that the family food security variable can be said to be a risk factor for stunting in Semarang (Table 2).

TABLE 1. Frequency Distribution of Research Variables

Variables	N=100	Percentage (%)
Stunting Status		
Stunted	50	50,00
Not stunted	50	50,00
Age of Parents		
≤25 years old	18	18,00
>25 years old	82	82,00
Parent Education		
Low education (junior high school and below)	27	27,00
Higher education (high school and above)	73	73,00
Parents' job		
Work	29	29,00
Doesn't work	71	71,00
Parents Income		
≤Rp2.000.000	92	92,00
>Rp2.000.000	8	8,00
Family Food Security		
Food insecure	39	39,00
Food secure	61	61,00
Feeding behavior in a toddler		
Less exact	40	40,00
Exact	60	60,00
Total	**100**	**100,00**

Source: Result analysis, 2023

TABLE 2. Relationship between Family Food Security and Stunting Cases and Relationship between Toddler Feeding and Stunting Cases in Semarang City

Family Food Security	Stunting Status				p-value	OR	CI (95%)
	Stunted		**Not stunted**				
	n	**%**	**n**	**%**			
Food insecure	30	60,00	9	18,00			
Food secure	20	40,00	41	82,00	0,000	6,833	2,732-17,093
Total	50	100,00	50	100,00			
Feeding behavior in a toddler	Stunting Status				p-value	OR	CI (95%)
	Stunted		**Not stunted**				
	n	**%**	**n**	**%**			
Less exact	28	56,00	12	24,00			
Exact	22	44,00	38	76,00	0,002	4,030	1,712-9,488
Total	50	100,00	50	100,00			

Source: Result analysis, 2023

The proportion of respondents with inappropriate feeding behavior in the toddler category was higher in the stunting group (56%), compared to the non-stunted group (24%). The proportion of respondents with proper feeding behavior in the right category was higher in the non-stunted group (76%) compared to the stunting group (44%). Table 2 also explains a statistically significant relationship between feeding behavior in toddlers and the incidence of stunting (p-value = 0.002) with an OR value of 4.030 (95% CI 1.712–9.488). Children who are cared for with inappropriate feeding behavior have a significantly greater risk of experiencing stunting compared to children who are cared for with appropriate feeding behavior. Given that the OR value is > 1 and the CI range does not exceed 1, it can be concluded that feeding behavior in toddlers is a risk factor for stunting in the city of Semarang (Table 2).

Food security is defined as the ability of individuals to fulfill their food needs through

the state. It can be seen in the availability of adequate food (Randani, Baliwati, Sukandar, & Tanziha, 2022; Suryawan et al., 2022; Tello et al., 2022; Usman & Masrul, 2022), both in quantity and quality, that is safe, diverse, nutritious, equitable, and affordable, and that does not conflict with the religion, beliefs, and culture of the community so that they can live, be healthy, active, and productive in a sustainable manner. Food security is very important because it can affect the nutritional status of the community. If food security is lacking, the nutritional status will automatically decrease and cause a decrease in health status. Based on the results of bivariate analysis, there is a relationship between family food security and stunting cases in Semarang City (p-value = 0.000). Children living in food-insecure families are six times more likely to experience stunting compared to children living in food-secure families (OR = 6.833, 95% CI = 2.732–17.093). It is confirmed by the results of previous studies, which found a relationship between food security and the incidence of stunting. In a previous study, the risk of stunting for children in food-insecure families was 6.9 times greater than for children in food-secure families (95% CI = 1.001–48.22) (Aritonang, Margawati, & Dieny, 2020).

Stunting is synonymous with poor family food security, and food insecurity in families is directly related to the incidence of stunting experienced by toddlers. Household food insecurity was the most consistent predictor of food group consumption. Household food insecurity is associated with low intake of grains, fruits, meat and eggs, oils and fats, and snacks. Mother's taste preferences predict increased consumption of whole grains, legumes or beans, vegetables, fish, and oils or fats (Masuke et al., 2021). Access to food in the home is a key factor in getting food that meets both quality and quantity needs. Not fulfilling access to food in a household can result in families not being able to meet the nutritional needs of toddlers, which can indirectly affect the nutritional adequacy of toddlers. Inadequate nutritional adequacy will result in poor growth for toddlers (Al Faiqoh, Suyatno, & Kartni, 2018).

The bivariate analysis showed a statistically significant relationship between feeding toddlers and the incidence of stunting in Semarang City (p-value = 0.002). Children with low eating behaviors are 4.89 times more likely to be stunted than those with high (95% CI 2.88–6.91) (Elni & Julianti, 2021). Children's eating behavior consists of two domains, namely children's refusal to eat and children's acceptance to eat. In this study, children's eating behavior was mostly low, and there was a significant relationship between children's eating behavior and the incidence of stunting. The proportion of children who refuse to eat is higher than those who accept food (Elni & Julianti, 2021). It impacts the lack of nutritional intake in children, so they are at risk of stunting because nutritional needs for growth and development are not fulfilled (Arsyad et al., 2020; Elni & Julianti, 2021). Diet (Krasevec, An, Kumapley, Bégin, & Frongillo, 2017; Ramadhani et al., 2022) is one of the most important behaviors that can affect nutritional status. It is so that individuals' and communities' levels of health (Brar et al., 2020; Dorsey et al., 2018; Fantay Gebru, Mekonnen Haileselassie, Haftom Temesgen, Oumer Seid, & Afework Mulugeta, 2019; Muche, Gezie, Baraki, & Amsalu, 2021) will depend on the quantity and quality of the food they consume. Feeding patterns that cause stunting in children are due to inadequate feeding factors such as less diverse types of food, neglect of parents during toddler meal times, forms of parental supervision when toddlers eat, and feeding patterns that are mostly still influenced by culture.

Based on research conducted in Lebanon, the category of family food diversity (dietary diversity) found that one in two mothers and one in three children (aged 6-59 months) had low dietary diversity scores (46% and 32%, respectively). The dietary diversity scores of children and mothers were found to have a strong correlation (p-value = 0.034). Regression analysis showed that the children's dietary diversity score increased by about 2 times [AOR = 1.7; 95% CI (1.042–2.914)] if the mother's dietary diversity score is high and increased by about 12 times [AOR = 11.7; 95% CI (1.2–111)] when being the highest-income household member (Abi Khalil, Hawi, & Hoteit, 2022). Children with a low minimum dietary diversity were more likely to be stunted than their peers

who received minimal dietary diversity (ARR 1.3, 95% CI 1.01–1.6) (Masuke et al., 2021). In another study, toddlers from mothers with poor feeding parenting styles were six times more likely to experience stunting than toddlers with good ones (Dayuningsih, Permatasari, & Supriyatna, 2020). In addition, children with a low minimum meal frequency had a higher risk of stunting, wasting, and being underweight (ARR 2.9, 95% CI 2.3–3.6; ARR 1.9, 95% CI 1.5–2.5; and ARR 1.9, 95% CI 1.5–2.4) (Masuke et al., 2021).

Conclusion

In the stunting group compared to the non-stunted group, a larger percentage of families fell into the food insecurity category. However, compared to the non-stunted group, the proportion of responders with inappropriate feeding behavior for toddlers was higher in the stunting group. Bivariate analysis revealed a statistically significant connection between stunting and family food security (p-value = 0.000, OR = 6.833, CI 95% 2.732-17.093) and toddler feeding behavior (p-value = 0.002, OR = 4.030, CI 95% 1.712-9.488).

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